REMARKS/ARGUMENTS

The specification has been revised to conform it to the preferred format for U.S. patent applications as required in the Office Action, and a Substitute Specification and Comparison Copy are submitted herewith.

Claims 1-3 and 5-7 are pending in this application. Claim 4 has been canceled. Claims 1-3 and 5 have been amended. Claim 7 is new.

The claims were revised to delete all drawing reference numerals from them without thereby in any way changing the substance of the claims.

Claims 1 and 4 were rejected on formal grounds because of the use of "and/or" and "e.g.". The objected-to terms no longer form part of the claims. In view thereof, applicant requests the retraction of this rejection.

Substantively, claims 1-6 were rejected under 35 U.S.C. §103 for obviousness over Pham (US 6,170,847) in view of MacLeod (US 5,794,966).

Claim 1 has been combined with claim 4 (canceled) and now recites amongst others:

> ... the supporting and actuating element including a hydraulic gas spring which is closed towards the exterior and which comprises a gas chamber as volume equalization and energy store, a hydraulic fluid chamber which is separate therefrom and a piston which is guided in the latter and which provides for a hydraulic displacement transmission, said piston being provided with a through-flow valve for hydraulic fluid adapted to be actuated by means of one of the control signals and the signal from the driver for being closed or opened, wherein the means for selective locking, unlocking tensioning and extending of the supporting and actuating element comprises a hydraulic pump for pumping hydraulic fluid from one side of the piston to the other side of the piston or vice versa during tensioning or extending of the supporting and actuating element

Claim 4, which now forms part of independent claim 1, was considered obvious over Pham because "the supporting and actuating element comprises a hydraulic system which is

closed towards the exterior (Column 9, Lines 1-40)". However, Pham does not disclose or suggest original claim 4 and therefore amended independent claim 1, for the reasons set forth below.

The Pham Publication

Pham has a single-track vehicle (1 in Fig. 1) including a device for stabilizing the vehicle. The stabilizing device comprises two support elements (ski-roller assembly 66) arranged on opposite sides of the vehicle. Each support element can be selectively lowered to the ground or raised from the ground by means of a hydraulic system including hydraulic cylinders combined with corresponding pistons (vertical outrigger strut 45 including vertical cylinder 46 and piston 47 and horizontal jack 26 including a horizontal cylinder and a piston, see Fig. 3).

The vertical outrigger strut 45 and the horizontal jack 26 are powered by hydraulic fluids stored in hydraulic fluids reservoir 38 and supplied under pressure by hydraulic pump 37. In order to selectively move the cylinders of outrigger strut 45 and horizontal jack 26 in one or the other direction (for lowering or raising support elements 66) a reversing rotary valve 60 is provided that is electronically controlled by means of electronic control module (ECM) 52 which generates control signals. The control signals depend on signals that are provided by speedometer 55 or impact sensor 57 (see column 10, lines 1-27) or other signals provided by the driver (see column 9, lines 41-64). If valve 60 is closed, piston 47 and, thus, outrigger strut 45 will be locked in place (see column 8, lines 20-25).

For providing suspension property for outrigger strut 45 and horizontal jack 26, gas chambers 54a and 54b are in fluid connection with the top ends of the outrigger strut 45 and the horizontal jack 26. The gas chambers 54a and 54b contain a gas at (about) atmospheric pressure and a portioning plate (see column 8, lines 33-64). For interrupting the fluid connection between gas chambers 54a, 54b and hydraulic cylinder 46, flow-control valves 53a and 53b open or close under signals from ECM 52 in order to activate the suspension system or deactivate it.

For rapid or emergency deployment of outrigger strut 45, a high pressure tank 28

in which compressed inert gas is stored is provided (see column 8, line 65 through column 9, line 40). High pressure tank 28 is connected to the top ends of vertical strut cylinder 46 and horizontal jack 26. Flow of gas from tank 28 to cylinder 46 and horizontal jack 26 is controlled by means of three different valves: valve 53e controls the gas flow directly out of tank 28, valve 53c controls gas flow to vertical cylinder 46, and valve 53d controls gas flow to horizontal cylinder 26. Valves 53c and 53d are normally kept open, unless when valve 53e is open, in which case either valve 53c or 53d is closed to allow for selective movement of vertical cylinder 46 or horizontal cylinder 26. Thus, in order to move vertical cylinder 46 downwards and to lower support element 66 to the ground, valves 53e and 53c are opened and rotary valve 60 is set in such a way that gas flows from tank 28 to cylinder 46 pushing piston 47 downward and moving hydraulic fluid on the bottom part of cylinder 46 back to fluid reservoir 38. To move piston 47 back to the upward position, rotary valve 60 is activated, causing hydraulic fluid to enter the bottom of cylinder 46. This in turn allows gas on top of piston 47 to escape via the fluid return line 33 toward the fluid reservoir 38 where the gas will escape to the atmosphere via vent 35.

In order to move piston 47 up or down and to raise or lower support element 66, either hydraulic fluid taken from fluid reservoir 38 or gas taken from high pressure gas tank 28 is used. It must be noted that fluid reservoir 38 is provided with vent 35. Either the hydraulic system or the gas system of Pham is therefore open towards the exterior (depending on the position of rotary valve 60). Thus, gas coming from tank 28 and being stored in the upper part of cylinder 46 can escape to the atmosphere via vent 35 (when piston 47 is moved upwards). When piston 47 is moved downwards by means of hydraulic fluid or gas entering the upper part of cylinder 46, the rotary valve is set so that the hydraulic fluid in the lower part of cylinder 46 is connected to the atmosphere (via vent 35).

As the foregoing demonstrates, the assertion in the Office Action relative to claim 4 (page 5 of the Office Action) that Pham discloses a hydraulic system which is closed towards the exterior is incorrect. The hydraulic system of Pham is open, as is demonstrated above.

Further, in contrast to amended claim 1, the hydraulic fluid in cylinder 46 and the

gas in high pressure tank 28 of Pham do not serve as "hydraulic gas spring". Since either the lower part of cylinder 46 or the upper part of cylinder 46 is connected via vent 35 to the atmosphere (depending on the position of rotary valve 60), the hydraulic fluid in the lower part of cylinder 46 does not influence the pressure of the gas in the upper part of cylinder 46. Furthermore, the pressure acting in cylinder 46 on piston 47 does not depend on the position of piston 47 with respect to cylinder 46. In addition, it is not possible to convert an upward movement of cylinder 46 into energy which can be stored in the gas in tank 28. Thus, the gas in tank 28 does not serve as energy store (for energy related to a movement of piston 47 which is induced by hydraulic fluid acting on piston 47).

In contrast to Pham, the device for stabilizing a single-track vehicle of amended claim 1 of the present application includes at least one supporting and actuating element (15) comprising a hydraulic gas spring which is closed towards the exterior. In Pham, the system is open to the exterior, as discussed in the preceding paragraphs. The supporting and actuating element 15 is used for selective lowering and raising of support elements (i.e. supporting rollers 5 of supporting device 4).

To actuate the hydraulic gas spring, amended claim 1 requires that:

(i) piston 25 is provided with a "through-flow valve for hydraulic fluid adapted to be actuated by means of one of the control signals [from a speedometer or a transverse acceleration meter] and the signal from the driver for being closed or opened", and

(ii) "the means for selective locking, unlocking, tensioning and extending of the supporting and actuating element comprises a hydraulic pump for pumping hydraulic fluid from one side of the piston to the other side of the piston or vice versa during tensioning or extending of the supporting and actuating element".

Thus, to actuate the supporting and actuating element 15 by means of signals, a single valve (through-flow valve 26) and a single hydraulic pump (29) are required. For actuating the supporting element 15, the (relative) portion of the hydraulic fluid being distributed

on one or the other sides of the piston is changed (whereas the total amount of hydraulic fluid in the hydraulic gas spring remains constant). For this purpose, a flow of hydraulic fluid from one side of the piston to the other side of the piston or vice versa is controlled by means of through-flow valve 26 or hydraulic pump 29.

Thus, the hydraulic gas spring of claim 1 is closed towards the exterior, the piston provides for a hydraulic displacement transmission, and the gas chamber serves as volume equalization and energy store.

Since the hydraulic gas spring is closed towards the exterior, the amount of hydraulic fluid and the amount of gas contained in the gas spring are constant and unchanged, even if piston 25 is moved in the hydraulic fluid chamber. Since the hydraulic fluid is incompressible, the piston 25 can only be moved in the hydraulic fluid if hydraulic fluid which is displaced on one side of the piston (upon movement of the piston) reaches the other side of the piston (via a through-flow valve 26 or hydraulic pump 29). The piston causes a "hydraulic displacement transmission" since the piston is "asymmetric" in the sense that the volume of the hydraulic fluid being displaced by the piston (upon its movement) is different for opposite sides of the piston (this is related to the presence of piston rod 32 which is present only on one side of the piston). Furthermore, since the piston provides for a hydraulic displacement transmission, a movement of the piston is only possible, if the pressure in hydraulic gas spring (which is closed towards the exterior) is changed and the gas chamber serves as volume equalization (based on the compressibility of the gas in the gas chamber).

As disclosed in the description (see page 4, last paragraph and page 5, first and second paragraphs of the present application), by a retraction of the piston rod 32 of the supporting and actuating element 15 the internal pressure of the hydraulic gas spring is increased. This effect is associated with a compression of the gas room (i.e. volume equalization). In this way, the hydraulic gas spring is tensioned. In addition, the mechanic energy which must be provided for tensioning the hydraulic gas spring is stored in the gas room, provided that any flow of hydraulic fluid from one side of the piston to the other side of the piston is prevented.

By means of through-flow valve 26 and signals controlling the through-flow valve 26, different operating states of supporting device 4 ("rigid", "loose", "tensioned", "extended") can be achieved (see page 5, third paragraph through page 7, first paragraph).

For extending the supporting and actuating element 15, it is sufficient to open the through-flow valve 26, provided the hydraulic gas spring is tensioned. In this case, the energy stored in the hydraulic gas spring is released, leading to an accelerated movement of the supporting and actuating element 15; i.e. the supporting device 4 passes into the extended state.

If the supporting and actuating element 15 is extended and the through-flow valve 26 is closed, the supporting device 4 is in the rigid state (see page 5, last paragraph) since hydraulic fluid cannot flow from one side of the piston to the opposite side of the piston. In this case, the vehicle is supported on three or four wheels 2 and 5 (see Fig. 2). Since supporting device 4 is rigid, steering actions are direct (i.e. like the behavior of a vehicle with three or four wheels).

If the supporting and actuating element 15 is extended, the single-track vehicle may be driven even if the through-flow valve 26 is open. In this case, hydraulic fluid can flow through valve 26 and the hydraulic gas spring is unlocked; i.e. the supporting device 4 passes into the loose state (see page 6, first paragraph). In this state, the supporting device 4 is lowered and, in forward travel mode, allows vehicle operation as a single-track vehicle (i.e. with steering in opposite direction, inclined position when turning). The supporting device 4 on one side or on both sides of the vehicle follows the road surface (depending on the lateral inclination of the vehicle, see Fig. 3). In this case, the hydraulic gas spring generates a small restoring force which increases with increasing inclination of the vehicle with respect to the vertical (this effect is related to the above-mentioned features (a), (b) and (c) of the hydraulic gas spring).

By closing through-flow valve 26 (depending on signals of the speedometer or a transverse acceleration meter or on signals from the driver), the supporting device 4 reverts again to the rigid state (see page 5, last paragraph and page 6, first paragraph).

If the through-flow valve is closed, actuating element 15 can be either tensioned

or extended by pumping hydraulic fluid from one side of the piston to the other side of piston by means of hydraulic pump 29, depending on the direction of the flow of the hydraulic fluid.

Thus, amended claim 1 differs from Pham at least as follows:

- Pham does not have a hydraulic gas spring that is closed towards the exterior, does not have a piston for hydraulic displacement transmission, and does not have a gas chamber that serves as a volume equalization and energy store, as required by claim 1.
- In addition, Pham does not disclose or suggest the claimed through-flow valve which allows to control different operating states of the supporting device. In particular, Pham does not disclose the above-mentioned loose state for supporting a single-track vehicle.

Relevance of the MacLeod Reference

MacLeod was relied upon in the Office Action because it discloses to influence the control device as a function of control signals from a transverse acceleration meter. Irrespective of whether this is the case, MacLeod does not disclose or in any manner suggest the features of original claim 4 that are now part of amended claim 1. Thus, MacLeod does not supply what is missing from Pham.

For at least this reason, Pham in view of MacLeod does not render claim 1 obvious.

In addition, MacLeod discloses a suspension system for automotives having four wheels with at least one pair of shock absorbers, each shock absorber including a hydraulic cylinder and a piston. The interior chamber of the shock absorber may (alternatively) include a segregated section which is filled with a pressurized gas. The upper part of the first shock absorber is fluidly connected with the lower part of the second shock absorber (via a first fluid line 38), and the lower part of the first shock absorber is connected to the upper part of the second shock absorber (via a second fluid line 36, see claim 1). By means of a valve member, a

part of the hydraulic fluid may be redirected from the upper part of shock absorber to the lower part of the same shock absorber and vice versa. However, the shock absorbers are configured such that all four wheels of the automotive are always in contact with the ground. It is not possible to operate the suspension system so that one of the wheels may be actively raised from the ground or lowered to the ground. In addition, it is not possible to keep one of the wheels in a raised position. Therefore,

MacLeod is not related to the problem of providing a device for stabilizing a single-track vehicle (having two wheels) and constitutes non-analogous art.

For at least this further reason, amended claim 1 is not obvious because, as discussed above, Pham does not disclose or suggest amended claim 1 for the reasons discussed above.

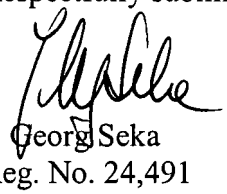
Dependent claims 2, 3, 5 and 6 are directed to detailed features of the present invention which are independently patentable. These claims are further allowable because they depend from allowable parent claim 1.

CONCLUSION

In view of the foregoing, applicant submits that this application is in condition for allowance, and a formal notification to that effect at an early date is requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at (415) 273-4730 (direct dial).

Respectfully submitted,



J. Georg Seka
Reg. No. 24,491

TOWNSEND and TOWNSEND and CREW LLP
Two Embarcadero Center, 8th Floor
San Francisco, California 94111-3834
Tel: (415) 576-0200
Fax: (415) 576-0300
JGS:jhw
61196404 v1